MERCURY JET TARGET FOR E-951

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E-951 Collaboration for Targetry Design
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Target Requirements

- Generate a one cm. diameter arcing horizontal jet of mercury to provide a 10 to 15 cm interaction length with the proton beam.
- Provide an unobstructed view of the interaction zone for high speed imaging.
- Operate simply, reliably and remotely.
- Safely contain projectiles which may be generated by mercury-beam interactions.
- Manage mercury vapor generation.
- Mounting system to provide for easy interchange of other test targets.
- Materials of construction must be compatible with mercury and survive a radiation environment.

Conceptual Approach

Internal and external target containments:

- Use commercial conflat vacuum components,
- blind-flange beam windows, quartz and/or Lexan view ports wherever possible.
- Use standard instrumentation and pneumatic feedthroughs wherever possible.

Design approach:

- design to reduce beam intensity on windows
- optimize materials to insure survivability
- insure mercury compatibility
- fiducial registration for target change out

Materials Considerations

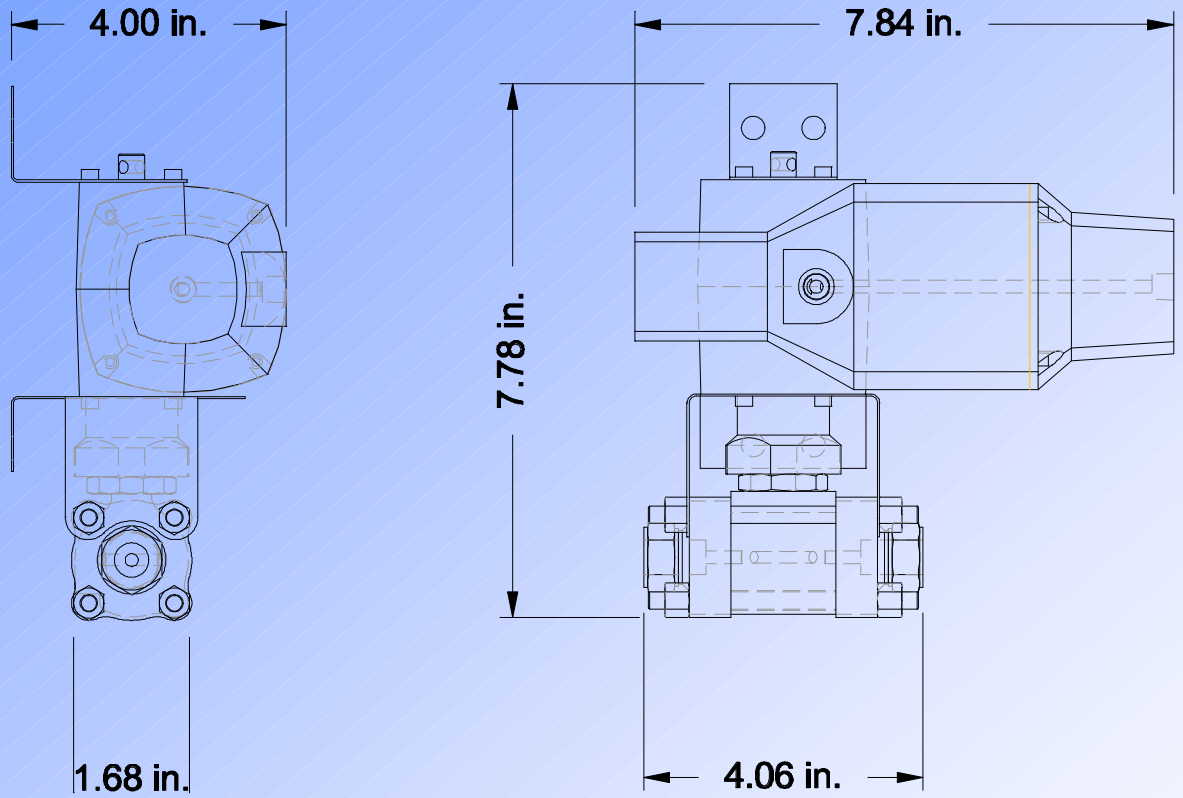
Containments:

- commercially available stainless steel components for inner containment
- welded stainless steel sheet for outer containment
- Inconel-718 external beam windows
- quartz internal viewports
- Lexan external view ports

Valves:

- stainless steel bodies
- Poly-Ether-Ether-Ketone seats
- Ethylene-Propylene o-rings

Pneumatically Actuated Ball Valve

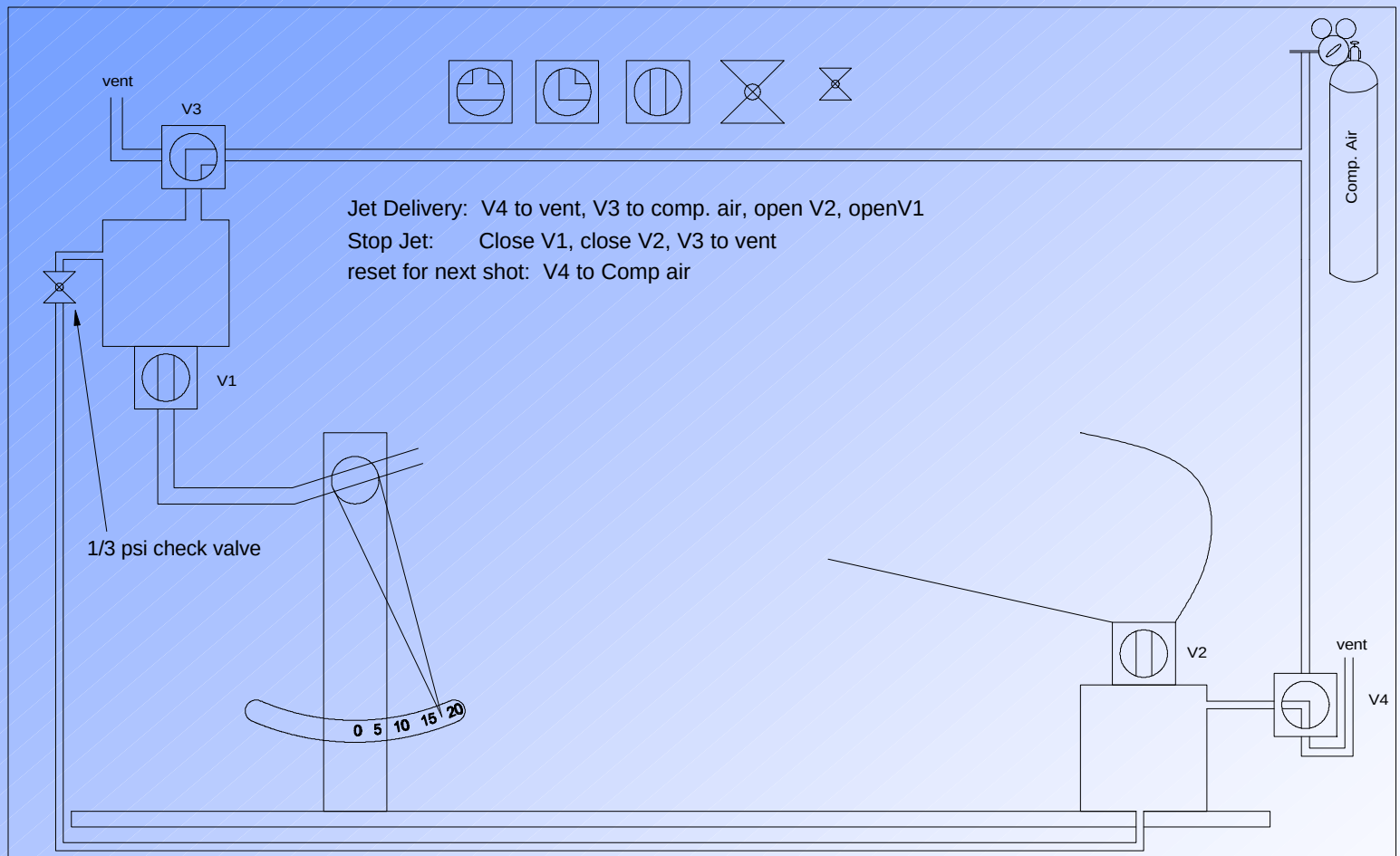


weight: 7.24 lbs
body: stainless steel
seats: teflon
cost: $391.10

1/2 inch swagelok fittings
rated 2200 psig from -20 to 100 F
rated 800 psig at 300 F
rated 100 psig at 450 F

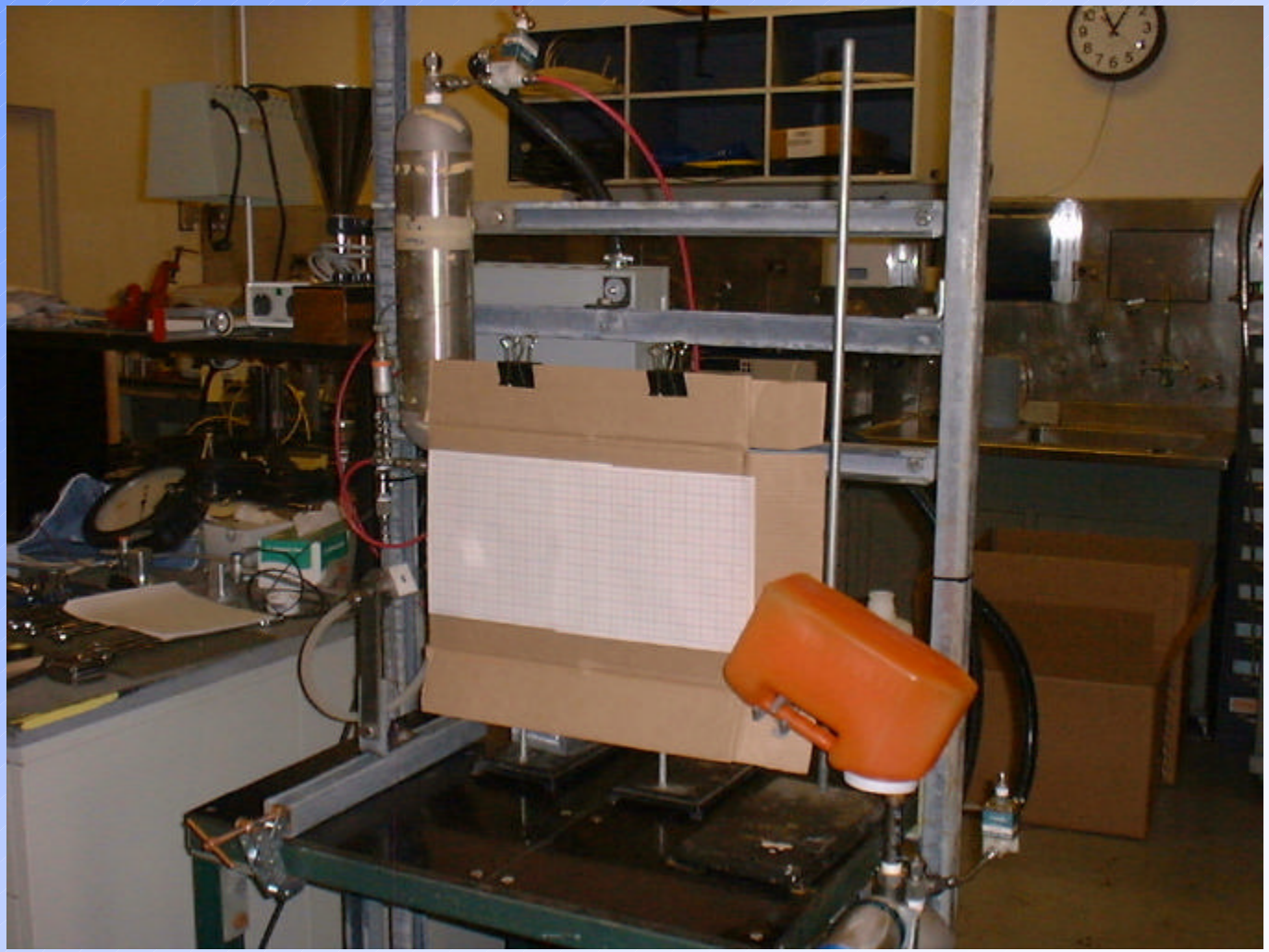
E-951 Muon Muon Collider Targetry	Whitey "60" series valve with pneumatic actuator	Date : 11/17/00
part numberSS-63TS8-33C		prepared by : C. Finfrock

Pneumatic Control System for Fluid Jet

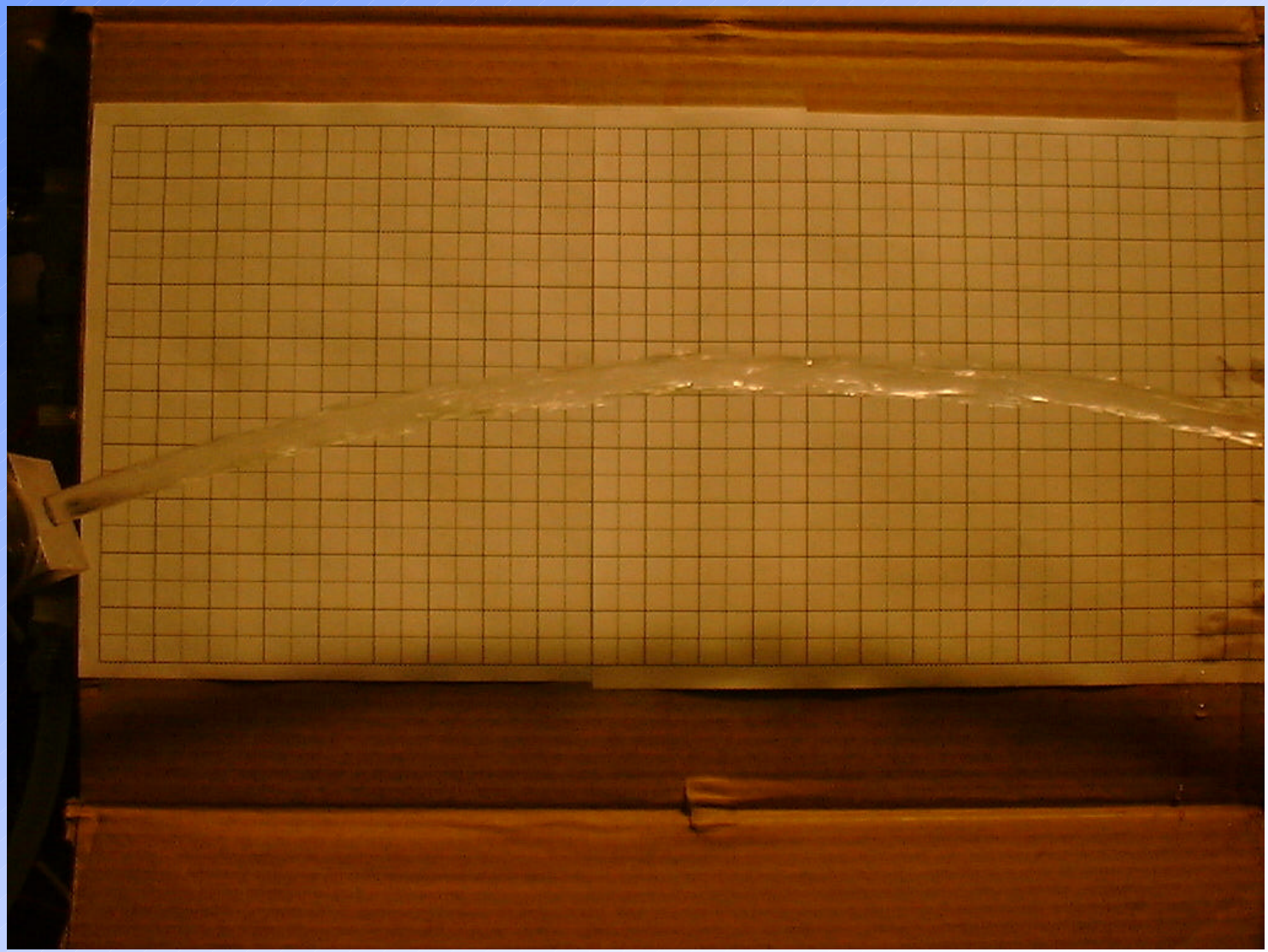


E-951 Muon Muon Collider Targetry	pneumatic control system	Date : 10/30/00
	for mercury jet target (prototype)	drawn by : C. Finfrock

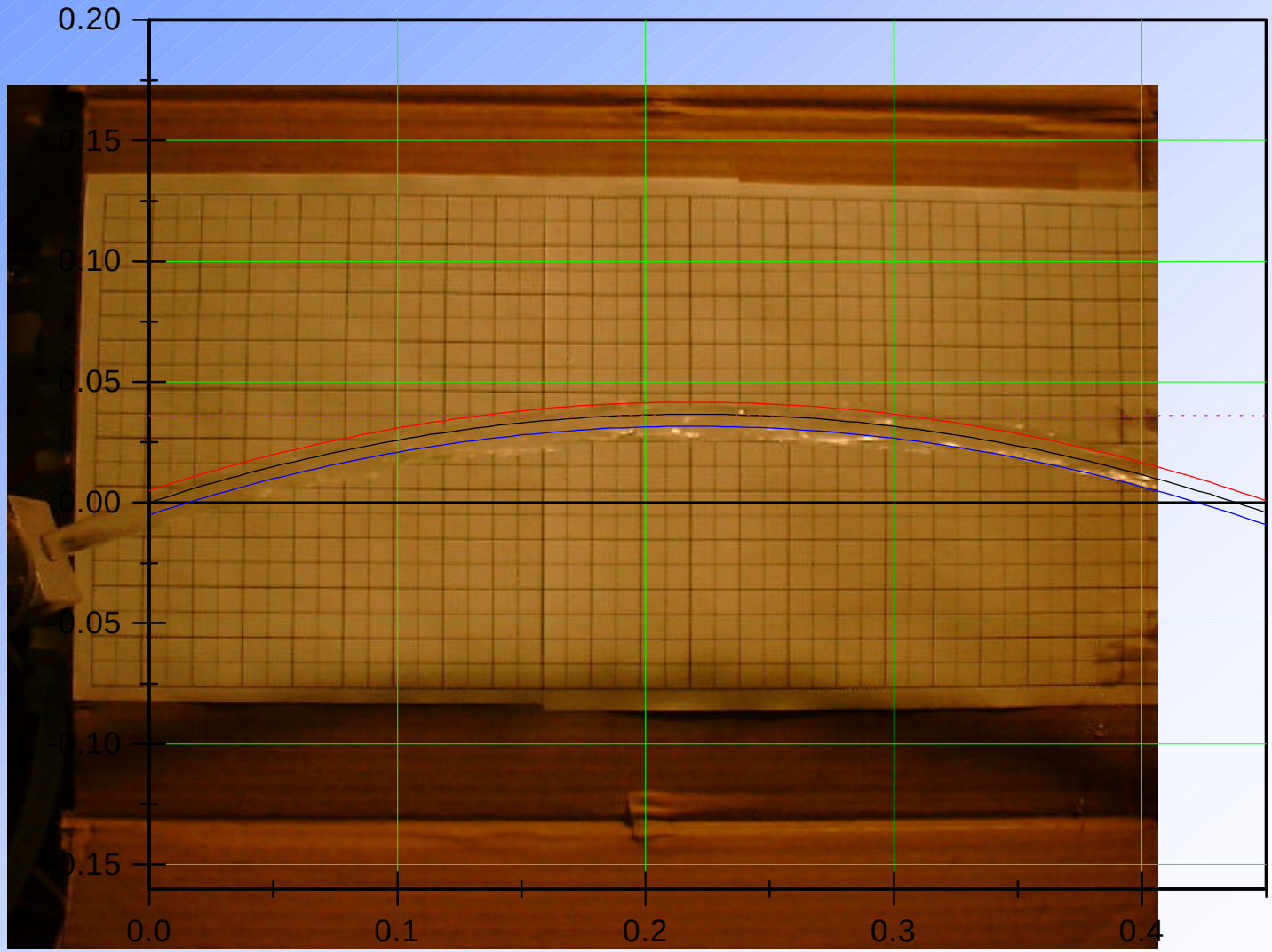
Apparatus to Simulate Hg Jet With Water



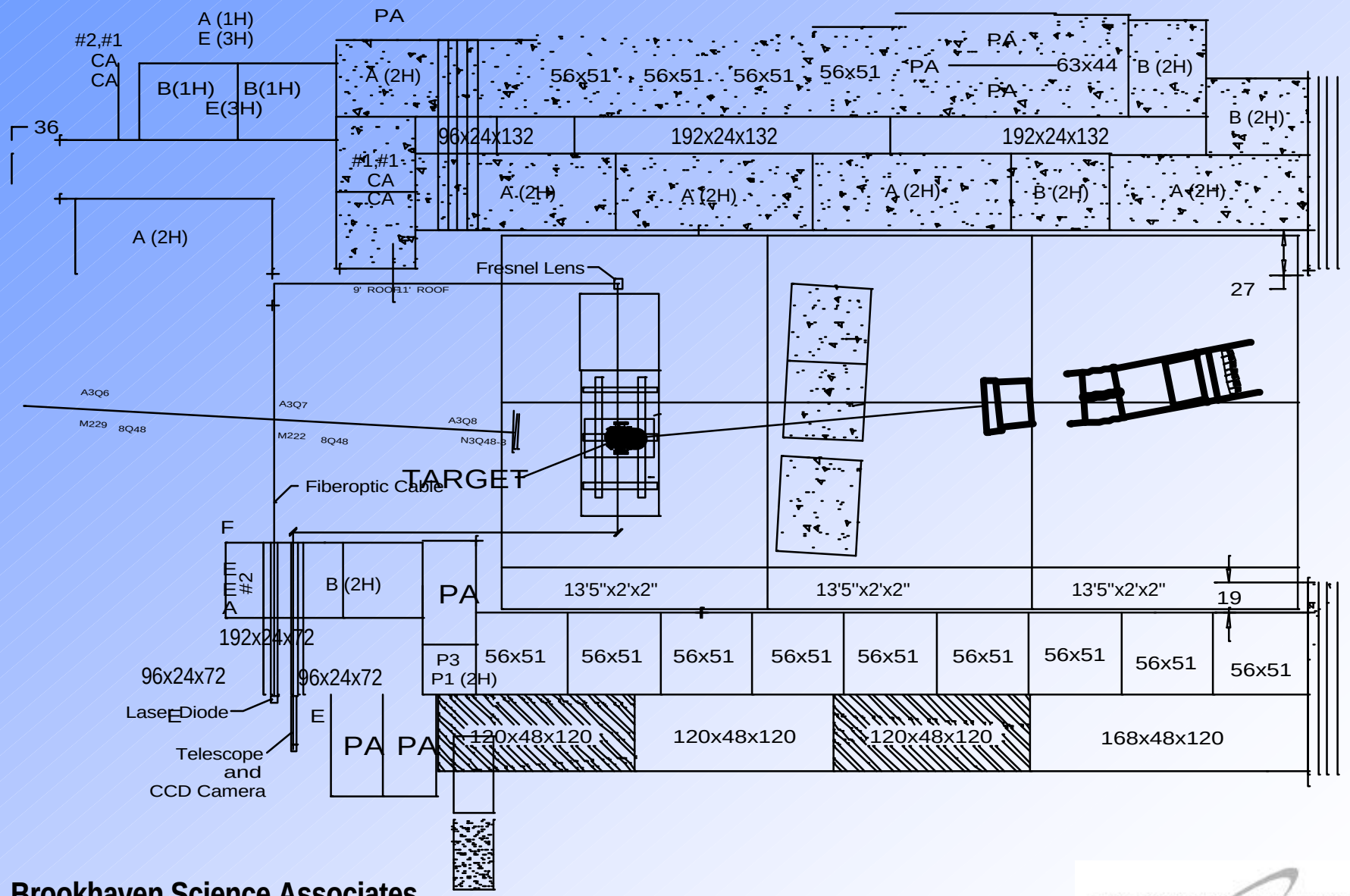
Water Arc Simulation of Mercury Jet



Superposition of Jet Trajectory and Calculation



Overall Beam Line Layout



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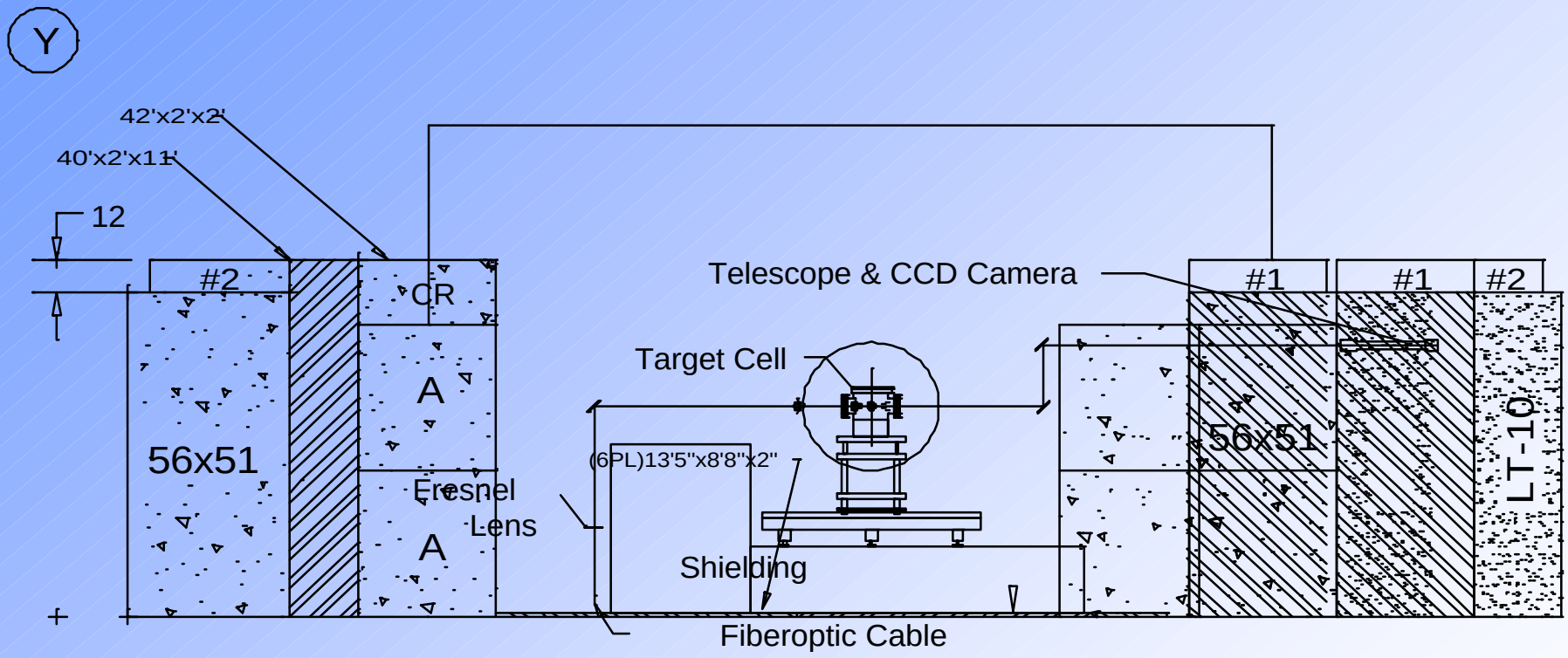
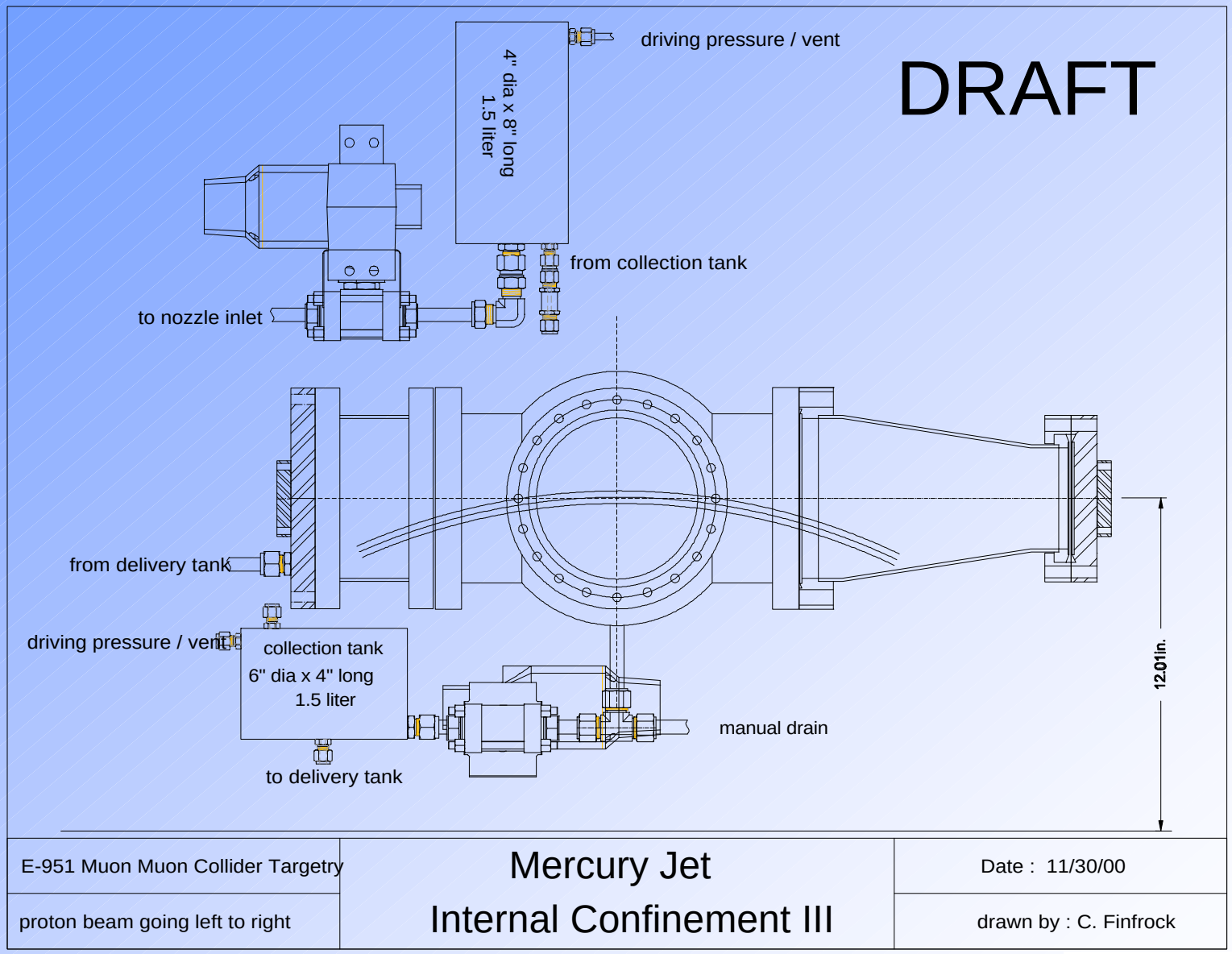
Schematic of Traversing Table Layout

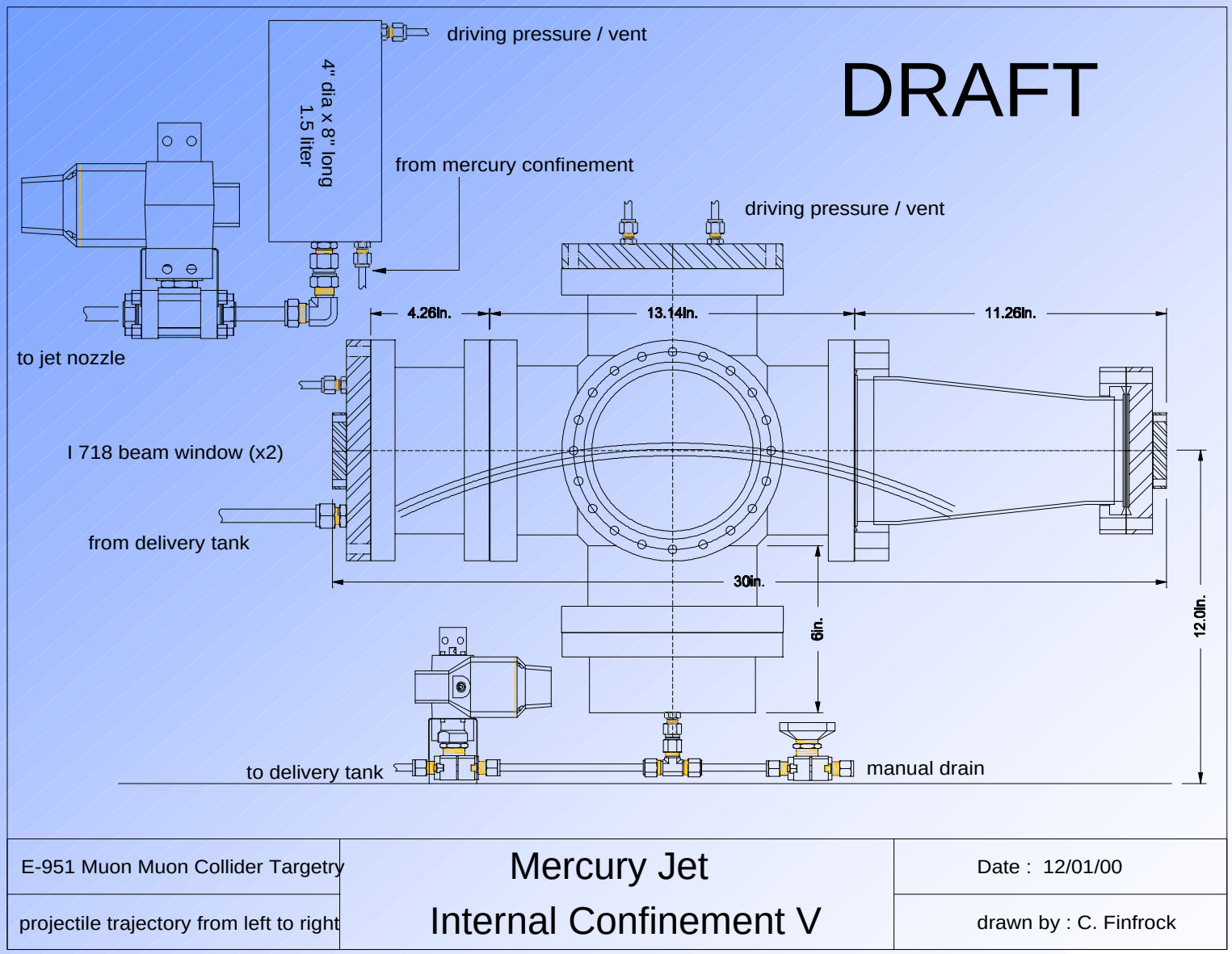


ELEVATION SECTION FF

Mercury Jet Internal Confinement, Remote Reservoir Design

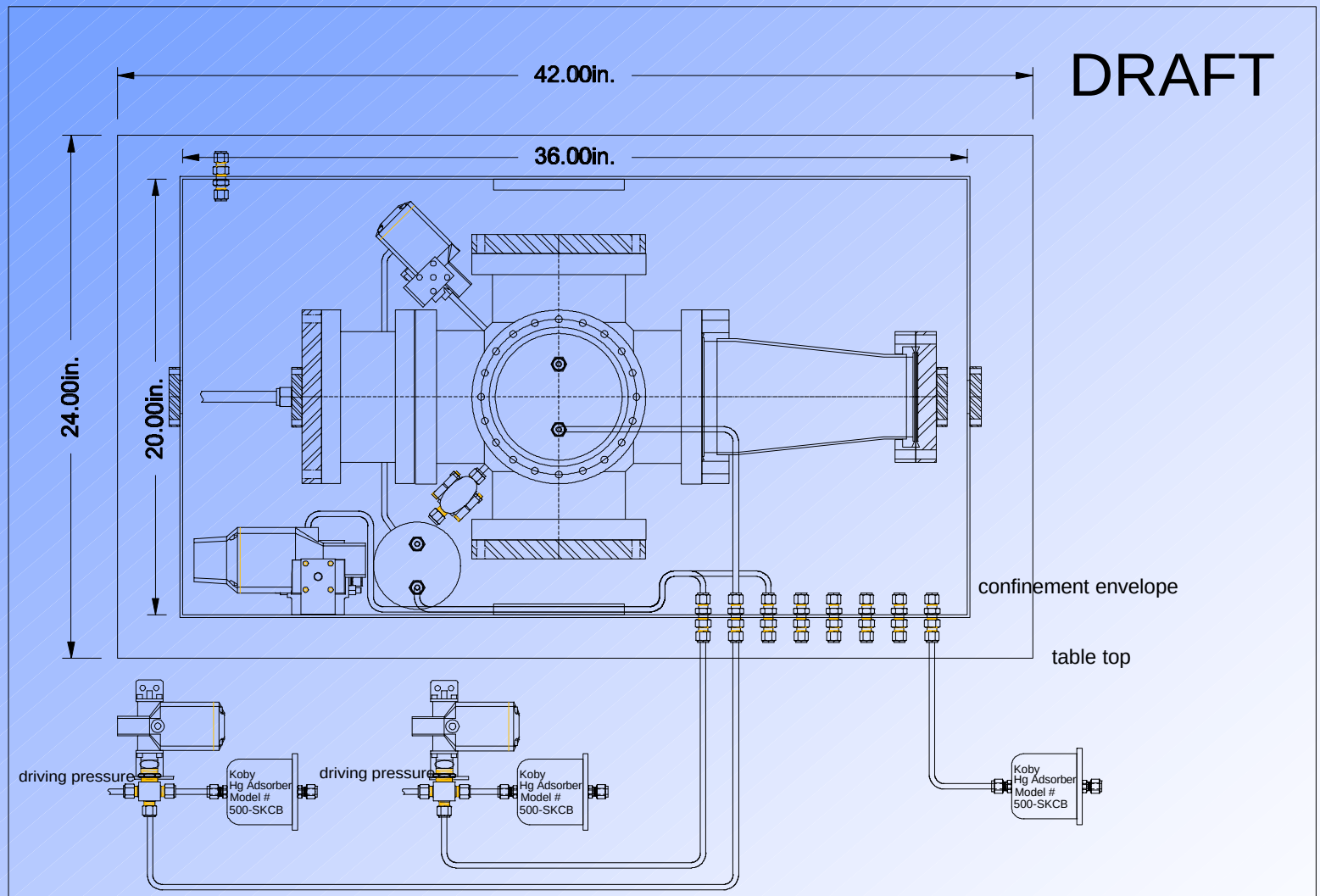


Mercury Jet Internal Confinement, Integral Reservoir Design



E-951 Muon Muon Collider Targetry	Mercury Jet Internal Confinement V	Date : 12/01/00
projectile trajectory from left to right		drawn by : C. Finfrock

Looking Into The Secondary Confinement From Above



E-951 Muon Muon Collider Targetry	Hg Jet Component Layout in External Confinement, Plan View	Date : 12/06/00 Revised : 12/14/00
particle trajectory from left to right		drawn by : C. Finfrock

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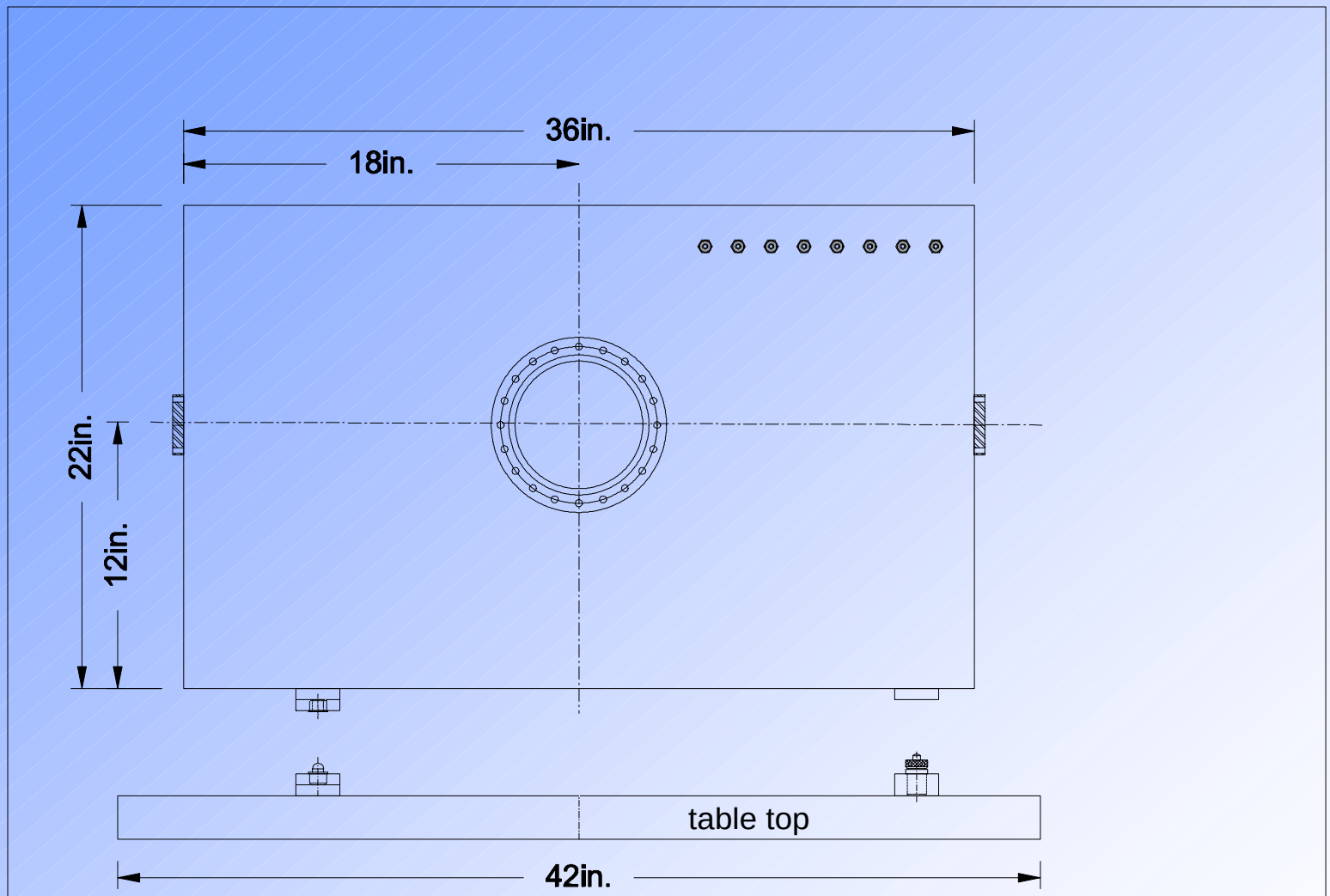
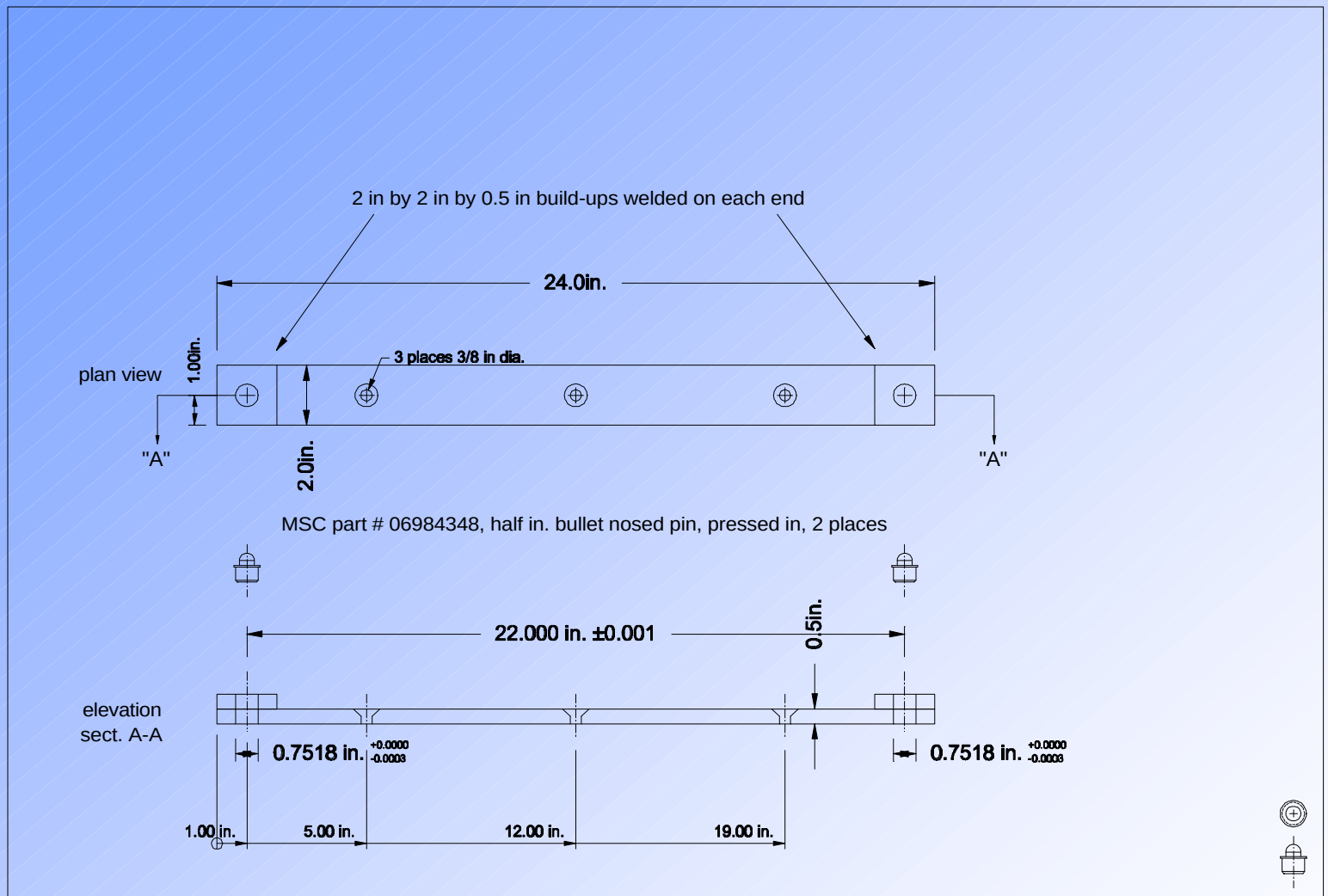
Side View of the Secondary Confinement



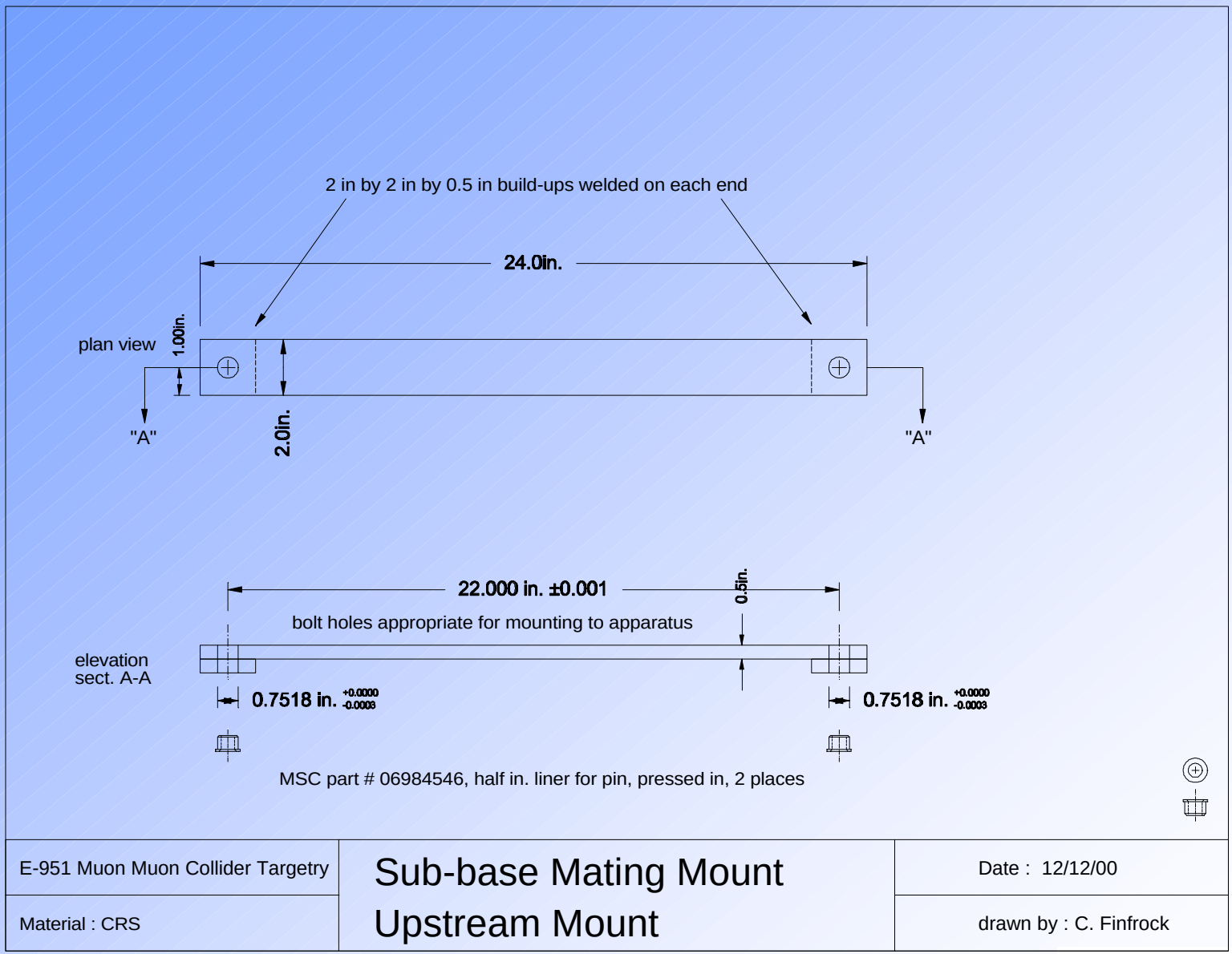
E-951 Muon Muon Collider Targetry	Hg Jet External Confinement Side Elevation View	Date : 12/14/00
particle trajectory from left to right		drawn by : C. Finfrock

Detail of the Upstream Experiment Mount, Table Component



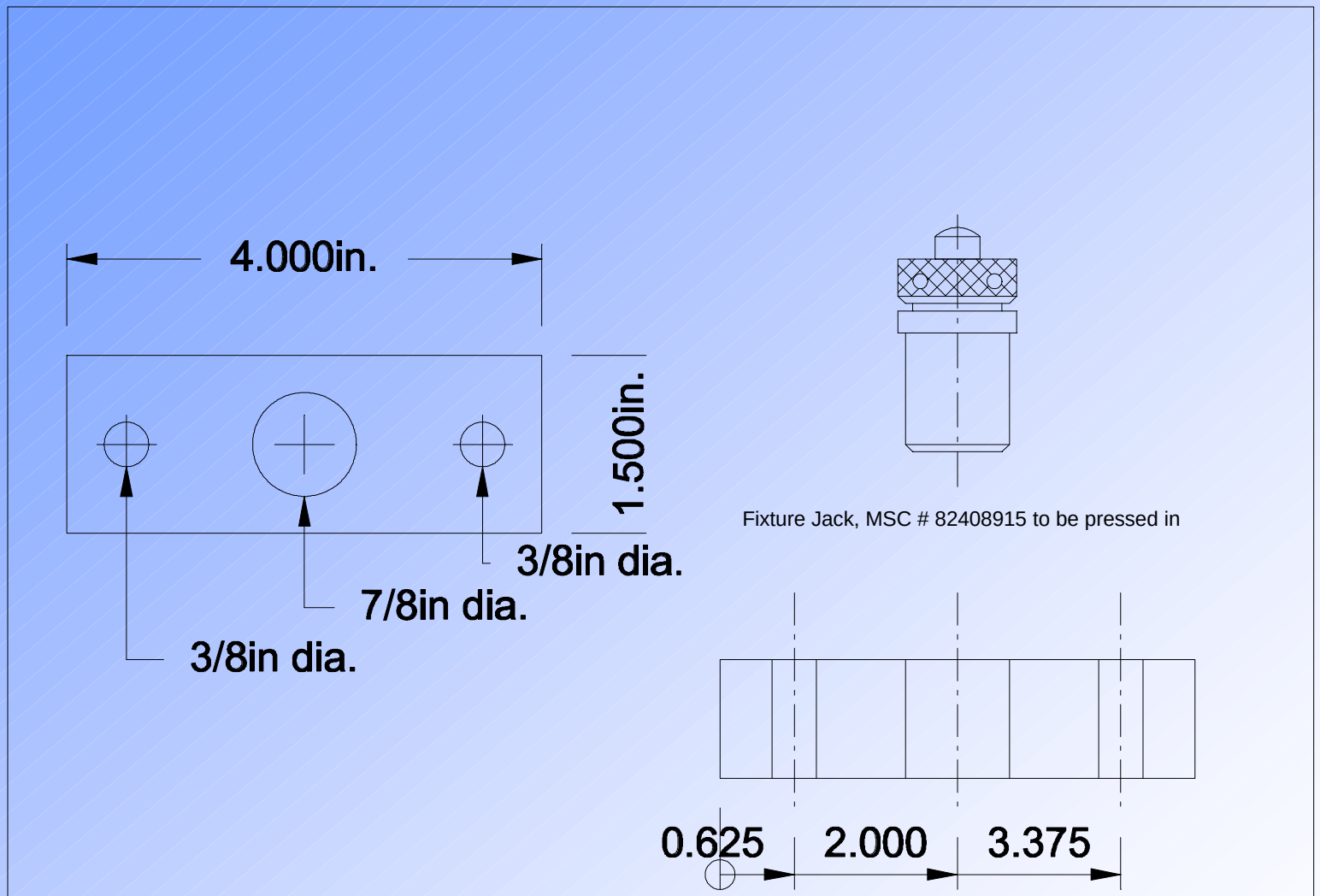
E-951 Muon Muon Collider Targetry	Sub-base for Mounting Expt. Upstream Mount	Date : 12/12/00
Material : CRS		drawn by : C. Finfrock

Detail of the Upstream Experiment Mount, Target Component



E-951 Muon Muon Collider Targetry	Sub-base Mating Mount Upstream Mount	Date : 12/12/00
Material : CRS		drawn by : C. Finfrock

Detail of the Downstream Experiment Mount, Table Component



E-951 Muon Muon Collider Targetry	Sub Base for Mounting Expt. Downstream mount	Date : 12/14/00
		drawn by : C. Finfrock

Current Status

Water jet tests are essentially complete.

Mercury jet target designs are substantially complete, minor detailing still underway.

Test stand will be installed in beam line very soon.

Materials list with prices and quotes about 75% complete. Ready to order many components now.

Next step is to prepare for the experiment safety review, then begin target construction.